perception of an object by the vision of a system of more or less luminous lines forming a kind of pattern.

The second principle is quite as well known, and is deduced from the duration of the luminous impressions upon the retina, a period of about one-tenth of a second. A series of impressions succeeding one another in a very short time produces the effect of simultaneous impressions; and it follows, that, in order to perceive the image which we have called the pattern, it is sufficient to receive the luminous impressions of the different lines that constitute it in an interval of time less than one-tenth of a second.

It was by taking this principle as a basis that Lissajous studied from an optical point of view the vibratory movements of bodies. His experiments are so well known that we need not enter into them here. Lissajous's curves are produced in a rectangular portion of a picture. If, on the other hand, this object possesses the power of illumination, all the rays proceeding from the space occupied by the curve will, in an exceedingly short space of time, converge at one point after having been subjected to a double reflection on the mirrors of the two tuning-forks that were employed for this experiment.

We may substitute for these forks any movable system whatever, bearing a series of mirrors arranged in such a manner that the displacement of each of them brings upon the same straight line all the rays projected from a portion of an illuminated object. Let us suppose these mirrors to be placed on a circle turning upon an axis perpendicular to its plane, and each of them making a different angle near 90° with this plane. To each mirror there will be a corresponding series of parallel lines in the picture; and, if the rotation is sufficiently rapid, all the rays proceeding from the object represented in the picture will meet at the same time, in as short an interval of time as required. It is thus possible to bring to one point all the luminous rays proceeding from a pattern; and, each portion of the image thus producing its impression upon the retina in succession, it is sufficient that the interval in which these impressions succeed one another should be sufficiently short for them to be rendered simultaneous.

The transformation of the luminous waves into electric currents is performed by means of a radiophonic receiver forming part of an electric circuit. This receiver may be a cell of selenium, lampblack, hydrogenated palladium, etc., the resistance of which varies with the quantity of light received. The different portions of the pattern will act differently, according to the quantity of light emanating from them, and in an interval of time less than one-tenth of a second. The variations of resistance of the circuit will correspond to the image observed.

In order to solve the opposite problem, i.e., to produce this image from the circuit at the receiving station, the writer proposes to employ the gas-telephone, which is an instrument of extreme sensitiveness. It consists of an ordinary telephone in which the portion comprised between the plate, the bobbin, and the inner sides, is in communication with a gas-pipe. The vibrating membrane is pierced in the centre with a little hole, through which escapes the gas, which is lighted. This little flame will undergo a variation in brilliancy at each movement of the membrane, and it will produce a continuous succession of rays similar to those converging upon the radiophonic receiver. In order to show them, and form an image similar to the pattern, a system of mirrors is employed similar to that used at the first station, but acting in the reverse way. It is evident that these two apparatus must act synchronously, like the Hughes and Baudot regulators employed in telegraphy. Station 2 will reproduce upon a sheet the lines taken upon the image at Station 1.

To sum up, the operation of this theoretical "phoroscope," as it is called, is as follows. The different parts which have been described being properly combined, the image to be transmitted is broken up into a series of parallel lines, the different points of which act in succession upon a selenium cell, varying the intensity of the current connecting the two stations. These variations in electrical intensity are transformed by the gas-telephone into variations of luminous intensity, and the successive changes of brilliancy of the little flame are projected upon a sheet at points corresponding to the various points of this sheet. Theoretically, nothing can prevent this double transformation of luminous intensity into electric intensity, but the realization of the experiment is surrounded with difficulties which make us fear that it will be long before a practical phoroscope is produced; but this should not discourage enterprising and persevering physicists.

NOTES AND NEWS.

LYDIA W. SHATTUCK, for over forty years teacher of botany in Mount Holyoke Seminary, died recently at an advanced age.

— Professor Daniel Kirkwood, for many years a professor of astronomy in the Indiana State University at Bloomington, has removed his residence to near Riverside, in southern California.

— Dr. George M. Sternberg of the army will deliver a lecture before the Brooklyn Institute on Dec. 26. He has selected for his subject "The Methods of Research in Bacteriology," to be illustrated by living forms of bacterial life thrown upon the screen.

— C. F. Wheeler of Hubbardston, Mich., has been appointed assistant in the botanical department of the Experiment Station at the Michigan Agricultural College, in place of Eugene Davenport, who has been elected professor of agriculture in the same institution.

— At the Johns Hopkins University a society of medical students has been organized on the plan of those in Berlin, the object being to bring the men of the various departments into closer connection, to stimulate original research, and to protect the claims of priority of work done by the members.

— Mr. Austin Corbin's game-forest on Croydon Mountain, New Hampshire, has been enriched, says *The American Field*, by the arrival there last week of a carload of buffaloes, two elks, a moose, deer, and a small band of antelopes. The buffaloes were shipped from Winnipeg, Man., by Buffalo Jones, who herds them there.

— The great astronomical event of this month will be the total eclipse of the sun, Dec. 22. Various governments have sent out parties to observe the eclipse itself, the United States steamship "Pensacola" having taken a well-equipped party from the United States to St. Paul de Loando, on the west coast of Africa, for this purpose.

— The greatest depth found by Capt. Spratt in the western Mediterranean basin was between Sicily, Sardinia, and Africa (about 10,600 feet). According to *Nature*, recent measurements in the eastern basin by Commander Magnaghi of the Italian Navy have yielded, as maximum depth, 13,556 feet, between the Islands of Malta and Candia.

— A brief outline of the rapid advancement that the practical application of electricity has made in the last few years is presented in "Everybody's Hand-Book of Electricity," by Edward Trevert, published by Damrell & Upham, Boston. The book is a paper-covered twenty-five cent volume, and treats briefly of electricity and magnetism, dynamos, electric lamps and motors, electric railways, electric welding, measuring instruments, galvanic batteries, and electric bells. It also contains a good glossary of electrical terms, and some useful tables for incandescent wiring.

— In June of the present year a series of observations on the velocity of the wind at the top of the Eiffel Tower was commenced. For this purpose there was erected on the tower, at a height of 995 feet above the ground, an autographic anemometer, constructed by Messrs. Richard Brothers of Paris, another of these instruments being at the same time put up at a station situated 1,650 feet from the foot of the tower, the height in this case being about 69 feet above the ground. Up to the 1st of October last, *Engineering* states, complete observations had been obtained for 101 days; and from these it appears that, on an average, the velocity of the wind is about 3.1 times as great at the more lofty station as it is at the lower. Moreover, the breeze at the top is always fairly strong, as, during the whole of the summer months in which observations were taken, the average velocity of the breeze throughout any given day always exceeded 23 feet per second, and during 21 per cent of the whole period of the observations this average daily velocity was upwards of 33 feet per second. No great storm seems to have occurred during the time over which the observations extend, and we do not know the maximum wind-velocity registered during this time.

— It is said that roaches may be exterminated if a powder thoroughly mixed, consisting of 37 parts of borax, 9 parts of starch, and 4 parts of cocoa, is liberally sprinkled in the cracks and corners of their *rendezvous*.

— The following free course of educational lectures, especially designed to interest the teachers of New York City and vicinity, has been arranged for, and will be given in the Assembly Hall of the College for the Training of Teachers, 9 University Place, on successive Tuesday afternoons at 4 P.M., beginning on Jan. 7, 1890: Jan. 7, "Rousseau's Pedagogic Theories and their Influence upon Educational Method," by James MacAlister, Ph.D., superintendent of schools, Philadelphia; Jan. 14, "The Teacher and the Time," by Miss Caroline B. LeRow, author of "The Young Idea;" Jan. 21, "The Teaching of English Literature," by Truman J. Backus, LL.D., president of the Packer Collegiate Institute, Brooklyn; Jan. 28, "The Voice as an Element in School Management," by E. H. Cook, Ph.D., head master of the Rutgers College Grammar School, New Brunswick, N.J.; Feb. 4, "The Function of a National Bureau of Education," by William T. Harris, LL.D., United States commissioner of education; Feb. 11, "The Duty of the State in the Matter of Training Teachers," by W. H. Maxwell, Ph.D., superintendent of schools, Brooklyn; Feb. 18, "Higher Education in the State of New York," by Melvil Dewey, A.M., secretary of the University of the State of New York; Feb. 25, "Physical Training in the Public Schools," by Addison B. Poland, A.M., superintendent of schools, Jersey City, N.J.; March 4, "Inventional Geometry," by Edward R. Shaw, Esq., principal of the Yonkers (N.Y.) High School; March 11, "Suggestions in the Teaching of Color," by Mrs. Hannah Johnson Carter, professor of form study and drawing, New York College for the Training of Teachers; March 18, "Education in the Nineteenth Century," by Henry M. Leipziger, Ph.D., principal of the Hebrew Technical Institute, New York; March 25, "An Observation Lesson," by John F. Woodhull, A.B., professor of natural science, New York College for the Training of Teachers; April 1, "Form Study and Drawing, and their Relations to General Education," by Mrs. Mary Dana Hicks, director of Prang's normal drawing classes, Boston, Mass.

— Col. Woodthorpe recently delivered at Simla a lecture on the Aka Expedition of 1883. It may be remembered that this tribe, which inhabits the hills north of Assam, owing to some forest disputes and a supposed interference with their trade in rubber, seized two English forest officers, and carried them off. To recover these men, a small expedition was despatched, under the command of Col. Woodthorpe. The Aka houses, according to *Nature*, are built on piles raised above the ground, with a large space at one end, where the children play. The dress consists of a tunic of Tibetan cloth, and trousers, reaching to the feet, made of thin white material. Long trousers are worn to keep off the *damdum*, a troublesome little fly or mosquito. Bows and arrows, and knives with blades easily detachable from a bamboo handle, are the chief weapons. The barbs of the arrows are dipped in aconite, and are so treated, that, when any attempt is made to pluck out the arrow, the barb breaks off, and remains in the wound. The poison is so deadly, that even a buffalo usually falls, after running a few yards, when he has been struck by one. Some of the superstitions of the Akas are curious. If a river runs between an Aka's house and his burying-place, his soul can never go home after death. This inability of the spirit to cross water is, however, overcome, and every year Akas may be seen stretching a string across the stream that divides the grave from the house of the departed. The ghost can easily cross when the slightest foothold is given him.

— It is sometimes said about old trees (e.g., an old lime in the new Gardens at Potsdam) that the present branches are properly roots; and it has been reported that trees may be planted, and will grow, in the inverted position. A scientific inquiry into this matter has been made by Herr Kny, in Germany, taking a number of plants of wild vine (*Ampelopsis*) and ivy about 3.5 metres high. *Nature* states that in 1884 he planted these with both ends in the ground; and in the spring of 1885, after the tops had rooted, he cut the arch at its highest point. In the first year, two of the plants died, but the others (twelve vine and fourteen ivy) grew vigorously, and were still alive this last spring. To test the extent of the inversion, he cut slips from the inverted plants, and planted them in a greenhouse, some with their natural, and some with their artificial upper end uppermost. It appeared that the callus, from which the roots spring, was formed at both ends, but more readily at the naturally lower end, whether this was above or below, in the experiment. Herr Kny considers, that, notwithstanding several years' successful culture, the inversion was not thoroughly completed. He proposes to continue his investigation, and invites people who have gardens to make like experiments with other plants, recommending willows, poplars, and roses.

— Dr. Quesneville, the French chemist, died on Nov. 14, at the age of eighty. He took his degree of doctor of medicine in 1834, having studied chemistry under Chevreul. In 1840 he started the *Revue Scientifique*, a monthly periodical, which he afterwards called the *Moniteur Scientifique*. This periodical came to an end in October last, Dr. Quesneville explaining that the task was rendered too severe by the infirmities of old age.

— Professor Meiklejohn has been lecturing at Perth, Scotland, on literature *versus* books, and, after an able and humorous dissertation, concluded by assuring his hearers that they had thousands of teachers, but what they needed to be taught most was to feel. Let them resolve to read as little as they possibly could, and to re-read what was the best, what was worth storing in our memory, what was worth learning by heart. Let them shun the stupefying influence of the modern demand for aimless, promiscuous, debilitating, and vapid reading. Let them look for that which forms, sustains, and perennially delights. Clear feeling, deep enjoyment, were what they wanted. With these they had literature; without these they had only a semblance of speech. Let them in literature shun mere acquaintances: let them form friendships. No man could expect to have a hundred friends; and so no man, especially in these crowded times, could know thoroughly and well more than five or six good books.

— According to a circular which has recently been sent to the leading physicists, electricians, and others interested in the history of English science, it is proposed to establish a Gilbert club, the inaugural meeting of which was convened Nov. 28 in the rooms of the Society of Arts, London, at 4.30 P.M. The object of the club, as we learn from *Nature*, is to do justice to the memory of the illustrious president of the College of Physicians, who was in the possession of, and was actually carrying on, the true experimental method of scientific inquiry at a time when Bacon was only talking and writing about it. There can be no doubt that the claims of William Gilbert of Colchester have been to a great extent overshadowed by the fame of the renowned lord-chancellor, and it is much to be regretted that we have not had handed down to us more of the results of Gilbert's labors than are to be found in his celebrated work "De Magnete," published in the year 1600. Such as it is, this work may, however, be justly regarded as the earliest English scientific classic, and its author must be recognized as the first truly philosophical investigator in the now all-important subjects of electricity and magnetism. The club has been organized for the object of bringing out an English edition of "De Magnete," as nearly as possible in the style of the original folio edition, and to arrange for a befitting celebration of the tercentenary of this work in the year 1900. To quote the circular, "The publication of 'De Magnete' not only marked an epoch in the science of magnetism, but constituted the absolute starting-point of the science of electricity. It has been hitherto a reproach to British electricians that they too little recognized the merits of the founder of the science." The preliminary list of members already includes the names of Sir William Thomson, Lord Rayleigh, Professor Tyndall, Sir John Lubbock, Professor Rücker, Professor Lodge, Mr. Preece, Professor Reinold, Professor Perry, Professor G. Forbes, Professor D. E. Hughes, Sir F. A. Abel, Sir F. Bramwell, Sir Douglas Galton, Sir H. Mance, Col. Festing, Capt. Abney, Professor Carey Foster, Professor W. G. Adams, Professor J. C. Adams, Professor Roberts-Austen, Professor Thorpe, Professor G. H. Darwin, Professor Liveing, Professor Dewar, Professor W. N. Shaw, Professor Poynting, Professor Ray Lankester, Mr. Crookes, Mr. J. Hopkinson, Mr. Glazebrook, Mr. G. J. Symons, Dr. J. H. Gladstone, Dr. B. W. Richardson, Professor Victor Horsley, Mr. Latimer Clark, etc.

— The fifth winter meeting of the Indiana Academy of Science will be held at Indianapolis, Dec. 30 and 31. It is desired that the first session convene at 10 A.M., Dec. 30. At the coming meeting a part of the work will be done in sections, of which two are to be organized: A, Zoology, Botany, Geology, and Geography; B, Chemistry, Physics, and Mathematics, The programme committee is composed of John M. Coulter, chairman, Crawfordsville, Ind.; and W. V. Brown, Greencastle, Ind.

— The production of essential oil of geranium in the island of Re-union in the Indian Ocean is assuming considerable proportions. The exports in 1887 were 2,786 pounds; and in 1888, 3,992 pounds; while during the present season they are estimated at 5,720 pounds; and for 1890, the plantations having been largely extended, at 13,000 pounds or more. The new flowers are now being distilled. In Africa, on the other hand, this season's yield of geranium-oil is said to have been much below the average.

— Early last month the newly appointed occupant of the Greek chair at Glasgow University, Professor Murray, delivered his introductory address in the Bute Hall of the college, before a very large attendance of students and the general public. Taking for his subject, as we learn from *The Educational Times*, "The Place of Greek in Education," Professor Murray said that the old classical system of education was attacked by two diverse enemies, — one what they might call the cultivated standpoint, and the other the mercantile standpoint. Those who led the battle from the cultivated or scientific standpoint would say, "Why should a boy spend all his time on one comparatively small branch of knowledge?" while the other enemy which classics had would think as follows: "Greek and Latin are dead languages. No one travelling abroad wants to speak them; no house of business will engage a clerk because he can write Greek; no great inventions, no railway or electric light, ever came from a knowledge of Greek; no great fortune was ever made by a knowledge of Greek." These two criticisms were of exactly opposite kinds. The former — the strength of which seemed to him irresistible, and he would not, if he could, battle with it — sought for a fuller and better education: the latter was the secret enemy of any education at all. He would point out, however, that as all departments of knowledge were equally honorable in themselves, and all equally deserved to be studied, so, on the other hand, they could not possibly be all studied by the same people. Some few subjects ought to be studied by everybody. He did not think Greek was one of them. Greek was a language of unusual difficulty, and a man could undoubtedly reach very high points of culture without any knowledge of Greek; but for the student of history, of political philosophy, of ethics, of logic, of archæology, and also for the student of most forms of art, the floods of light that ancient Greece could shed upon these subjects were something incalculable and beyond price. Heaven forbid that he should unduly magnify his office or cry up his wares in the spirit of a charlatan, but he believed that there was but one nation, uniquely gifted and uniquely interested, to be found in all the annals of mankind; and if they were to choose some one period of history, some one department of the great world of knowledge, to educate their youth with, he believed, that, for those minds which were naturally attracted to it, the study of Greece was an education as full and as stimulating as lay within man's reach at the present time.

— One of the most interesting and valuable results of recent French horticultural effort is found in the new race of dwarf cannas, with large and brilliantly colored flowers, produced by M. Crozy of Lyons. A large bed of these plants in the garden of the Trocadéro, in Paris, was surrounded all summer by crowds of people. Too much has not been said of the beauty of these plants, and of their value for decorative purposes, whether planted in the open ground or grown in pots or tubs. The colors of the flowers of some of the varieties, says *Garden and Forest*, are surprisingly brilliant. There seems no good reason, however, for calling the plants "dwarf," except that they begin to flower when they are not more than twenty inches high; for they grow, especially in this country, when generously treated, to a height of six or eight feet. Seventeen of the new varieties exhibited at Paris for the first time (which, on the whole, are no better than those sent out by M. Crozy during the past two years) are described in a recent issue of the *Revue Horticole*. No one who has not seen a collection of M. Crozy's cannas in good condition can form the faintest idea even of the beauty and the brilliancy of the flowers of the plants.

— From a thousand prune-trees five years old, Capt. Guy E. Grosse of Santa Rosa, Cal., has this season dried five tons of fruit, which he is delivering, according to *Garden and Forest*, at the Southern Pacific station for eastern shipment at four and a half cents a pound. The rapid maturing of a prune-orchard, after arriving at the fourth year, is shown by the increase in the crop of this year over that of last year, when the yield was but twelve hundred pounds. Next year it is expected the crop will be trebled. At four and a half cents a pound, the proceeds from the thousand trees this year equals four hundred and fifty dollars. In two years more it should be nearly three thousand dollars.

— The registrations of the sunshine recorder at Ben Nevis Observatory, according to a report read at the British Association at Newcastle, showed 970 hours of sunshine during the year; the smallest number of hours for any month being 8 for November, and the largest 250 in June, being nearly half the possible sunshine. The numbers of hours for the four years now observed, beginning with 1885, were 680, 576, 898, and 970. The contrast of the sunshine of 1886 with that of 1888 is thus very striking. The amount of the rainfall for the year was 132.46 inches; the month of least rainfall (3.76 inches) being June, and the greatest (20.60 inches) being November. The number of days on which precipitation was *nil*, or less than the hundredth of an inch, was 118. The numbers of rainless days for the last three years have been 159, 128, and 118. From all the observations yet made, it is seen that a fall equalling at least one inch a day has occurred on an average of one day in nine. Atmospheric pressure was this year again above the annual average, the mean level being 29.889, or .055 higher. The lowest mean at the observatory (25.035 inches) occurred in March, and the highest (25.595 inches) in September, the difference being .555 of an inch. At sea-level at Fort William, the extreme monthly means were 29.636 inches in November, and 30.132 in September, the difference being .496 of an inch.

— Some investigations have lately been made into the question of the vibration in buildings caused by machinery in motion. These were made in connection with the Westinghouse engine, in cases where it was necessary to place engines of this type on upper floors. The theory based upon these investigations is, that, if the slight motion which every engine has is exactly in time with the natural vibration of the floor-beam, each pulsation of the engine will increase the scope of the vibration of the floor, resulting in a most disastrous shaking; while, if the pulsations of the engine are in discord with the floor, comparative quiet will exist. As floor-beams are usually long, and their time of vibration correspondingly long, it is usually found that a fast-running engine will give less of its vibration to the floor-beams than a slow-running one. It is also worthy of note that the vibrations of a fast-running engine are more numerous and less forcible, hence easier resisted by the mass of the floor. An interesting example of preventing vibration by discord was shown in the case, reported in *The Railroad and Engineering Journal*, of a Westinghouse 10 horse-power engine, which, on an upper story of a silverware-manufactory, created such a commotion as to rattle the silverware on the shelves a hundred feet distant. A change of 25 revolutions, increasing the speed, entirely stopped the vibrations. In another case — the factory of Arbuckle Brothers in Brooklyn — two Westinghouse engines of 125 horse-power each, and one of 45 horse-power, are located on the fifth floor. These engines were erected on the heavy floor-timbers, the floor-boards being cut away, and extra timbers being inserted between the joists. Across said timbers were placed oak stringers, which have been seasoning since the war in some unfinished vessels in the Brooklyn Navy Yard. On these the engines were mounted with plain fly-wheels, and experiments were conducted to determine the speed at which it would be best to run. It was found that at 204 revolutions the vibration was at the minimum, and was very slight, being as little as that caused by any of the ordinary driven machinery. The speed was therefore fixed at this point, and the wheels then made to give the proper belt speed.

— The annual reports of the superintendents of the several fish-hatcheries (six in number) were made at a meeting of the commissioners recently held in New York, as reported in *The American Field*, and show great prosperity and efficiency. The distribution of fry last year exceeded twenty millions in number, and the supply of spawn for this winter's operations is larger than in any previous year. Six millions of salmon-trout eggs have been gathered at the upper Great Lakes. The Adirondack, Fulton Chain, and Saconda ga hatcheries have collected from the wild trout of their respective localities all that their troughs will contain, besides the large supply of salmon-trout eggs to be hatched. At Caledonia one hundred thousand are taken daily by stripping the stock fish. The commission will this year work the private hatchery of M. B. Hill at Clayton. Here wall-eyed pike, whitefish, and siscoes are to be hatched. At the Chautauqua Lake station experiments are to be continued with muscalonge. The three Adirondack hatcheries have now an output sufficient for all the accessible wilderness region, leaving the large production of Caledonia principally for the supply of the Catskill, Beaverkill, Neversink, and upper Delaware regions, which are so much frequented by tourists. An additional shad-hatching station is to be established on the Hudson River, so that the supply of this choice market fish may be increased. It is expected that the total output of fry of all kinds next year will be fully thirty millions.

— Experiments have been made recently in this city and Newark with a South American bean called the "angola," with the view of substituting it for gambier, but the *Oil, Paint, and Drug Reporter* announces that the tests were not satisfactory. This new material has been offered at one cent per pound less than gambier, and New Jersey tanners imagined that they had been put in possession of a valuable addition to their raw materials until the trials demonstrated that gambier could not be substituted so easily. The importation of the peculiar beans has practically ceased in consequence, and South American houses have been requested to pursue their investigations further, in the hope of obtaining some new product which would be of value in this line, as there are times when it is desired to prevent the fluctuations in gambier by pushing an article to take its place. Some attention is being directed to canaigre-root, which was described in the *Reporter* of Sept. 4, but great difficulty has been experienced in obtaining supplies from Mexico. The inquiries come from tanners, but thus far they have not been satisfied; and it is questionable if a cheaper article than gambier can be found to meet the same requirements.

— Mr. H. L. Bolley, in a bulletin of the Agricultural Experiment Station of Indiana, arrives at the following conclusions regarding wheat-rust: 1. The rusting of wheat is due to the attacks of several species of minute fungi. 2. The disease is propagated by means of various spores, one form of which is developed upon various determined and undetermined plants, mostly weeds. This side form is not as yet proved to be essential to the continued life of the parasites, but its destruction decreases the danger from serious attacks of the disease. 3. One species (*P. rubigo-vera*), in its uredo stage, is able to pass the winter in the tissues of the young wheat-plant. 4. In warm weather any conditions of the soil or atmosphere which tend to keep the wheat-leaves constantly wet are conducive to the rapid spread of the disease. 5. Low-lying, rich soils are most subject to the disease. 6. No variety of wheat is known to be rust-proof, yet some possess greater powers of resistance than others. 7. Though not proved, an excess of nitrogen in the soil is to be considered probably as liable to produce wheat easily affected by rust. If fertilizers are to be applied to such lands, those containing only inorganic elements are most advantageous, so far as immunity against rust is concerned. 8. In districts liable to severe visitations of the disease, early-ripening wheats are to be preferred.

— The *Deli Courant* states that search for petroleum along the banks of the Lepan River, in Langkat, in Netherlands-India, has resulted in the discovery of large deposits of that oil. Raw petroleum oozes out of the ground at many places where the natives have consequently dug pits. The output from most of the latter has never been considerable, and shows fluctuation. At Telega Tunggal, where the boring reached a depth of about three hundred and fifty feet, more important results have been arrived at. Appearances indicate that the main reservoir has been tapped there. The oil met with in the other pits and deposits proved to have found its way above ground from that storing-place. The oil tested yields thirty-five per cent of lamp-oil of good quality. It does not contain harmful ingredients, and offers advantages as a lubricator. The exact depth of the other deposits remains to be determined before an estimate of working expenses can be accurately made.

— The fifteenth annual meeting of the New Jersey State Horticultural Society will be held at Trenton on Wednesday and Thursday, Dec. 18 and 19.

— A very important announcement is made in the *Medical and Surgical Reporter* in regard to the University of Pennsylvania; namely, that Dr. John S. Billings has, with the approval of the secretary of war and of the surgeon-general, accepted the position of medical director of the University Hospital, to which he was recently elected, and that the duties of this new position will be so arranged as not to interfere with his duties as medical officer of the army at the surgeon-general's office. It is also announced that the University of Pennsylvania is soon to have a new laboratory of hygiene, to cost about $200,000, and that $100,000 have been already collected for this purpose. The department of hygiene has been under the supervision of Dr. Samuel G. Dixon since the death of Dr. N. A. Randolph, who was recently one of the editors of the *Medical and Surgical Reporter*. It was rumored at first that Dr. Billings was to supersede Dr. Dixon; but the provost of the university promptly denied this rumor, and stated that Dr. Dixon was still professor of hygiene in the university, and in charge of the laboratory of hygiene, which has been equipped through his exertions and liberality. It does not yet appear just what Dr. Billings will do at the university, but the probability is that he will be at the head of the department of hygiene. For this he is abundantly fitted, as he is recognized as an authority upon the subjects of hygiene and hospital construction and administration. The elaboration of the plans for the construction of the Johns Hopkins Hospital, and his coming, will be a valuable accession to the teaching force of the University of Pennsylvania.

— The Glendon Iron Company of Easton, Penn., operating one of the largest blast-furnaces on the Atlantic coast, have for a number of years followed a somewhat novel plan of getting out their limestone for furnace purposes. Their quarry, located at Glendon, Penn., has a perpendicular face, varying from 120 to 160 feet in height; and instead of drilling down a few feet back from the face of the quarry at the top, and taking the stone off in benches, as is done in other quarries in the East, they drive a tunnel back at the foot of the quarry, and from that horizontally in both directions on a parallel line with the base. The powder is loaded in chambers located in this latter tunnel, and sunk a few feet below the base-level. The tunnels are then filled up to the opening, and the explosives fired by electricity, Such a blast as this was fired with most successful results on the 27th of September last, and, as described in *The Engineering and Mining Journal*, it appears that the tunnel from the face-line was driven directly back 50 feet, the length of the horizontal tunnel being 135 feet. Four chambers were located on this tunnel 5 feet deep, the diameters being from 4 × 6 to 4 × 7 feet. In these was loaded Judson R. R. P. powder, divided respectively into lots of 8,000, 5,000, 3,000, and 4,000 pounds. The blast was fired by the superintendent of the Glendon Iron Company, Mr. M. P. Janney, and it was estimated that 60,000 tons of limestone were dislodged. About once each year this company fire one of these blasts, having always met with uniform success. While the cost of Judson powder is somewhat higher than that of black powder, the smaller quantity required, and the fact that it breaks the stone up finer, making it easier to handle, and requiring less drilling for block-holing, show a decided economy in its favor. On the Pacific coast this method of tunnelling beneath the burden, and firing in large charges, is generally adopted by railroad contractors and others, where large quantities of earth or rock are to be removed; but, with the exception of the Glendon Quarry, we do not know that the plan has come into vogue in the eastern part of the United States.